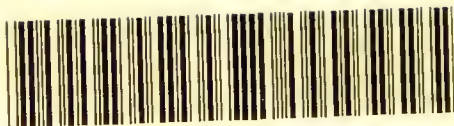


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PHTHISIS AND THE STETHOSCOPE :

OR

THE PHYSICAL SIGNS OF CONSUMPTION.

(By the same Author)

ON CONSUMPTION:

ITS NATURE, SYMPTOMS, AND TREATMENT.

To which was awarded the Fothergillian Gold Medal of the
Medical Society of London.

Second Edition, 8vo.

PHTHISIS AND THE STETHOSCOPE:

4.
OR THE

PHYSICAL SIGNS

OF

C O N S U M P T I O N .

BY

RICHARD PAYNE COTTON, M.D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON. PHYSICIAN TO THE HOSPITAL
FOR CONSUMPTION AND DISEASES OF THE CHEST, BROMPTON.

SECOND EDITION.

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TO

P. C. A. LOUIS, M.D.

PHYSICIAN TO THE HÔTEL DIEU, PARIS,

ETC. ETC. ETC.

AND TO

W. H. WALSHE, M.D.

PROFESSOR OF MEDICINE IN UNIVERSITY COLLEGE, LONDON,

AND CONSULTING PHYSICIAN TO THE HOSPITAL

FOR CONSUMPTION AND DISEASES OF THE CHEST,

This Little Book

IS (WITH THEIR PERMISSION) DEDICATED,

AS A MARK

OF THE ESTEEM AND GRATITUDE

OF THEIR FRIEND AND FORMER PUPIL,

THE AUTHOR.



PREFACE.

IN offering to the profession the second edition of this little book, the author would merely observe that his great aim has been to make it of as simple a character as possible, and to separate it from everything hypothetical.

Practical statements, freed from whatever is either complicated or unessential, with conclusions more ample and varied than those in the former edition, are alone dwelt upon,—conclusions which have been abundantly tested by observation, and

which the author cannot but hope may serve others, as they have often served him, at the bed-side of the patient.

Clarges Street, Piccadilly.

October 1859.

CONTENTS.

CHAPTER I.

INTRODUCTORY.

Connexion of physical signs with general symptoms— Relation of the thoracic and general conformation to the development of consumption . . .	Page 1
--	--------

CHAPTER II.

THE FIRST STAGE OF PHTHISIS.

The situation of tubercle—The earliest signs of pulmonary tuberculosis—Morbid changes in the respiratory murmurs	6
--	---

CHAPTER III.

THE FIRST STAGE OF PHTHISIS (CONTINUED).

Changes in the form and movements of the chest— Alterations in the percussion-sound	17
--	----

CHAPTER IV.

THE FIRST STAGE OF PHTHISIS (CONTINUED).

Vocal and tussive fremitus—Bronchophony and bronchial eough—Morbid extension of the heart's sounds—Arterial and venous murmurs	25
--	----

CHAPTER V.

THE FIRST STAGE OF PHTHISIS (CONCLUDED).

Dry crackling, subcrepitant, sibilant, sonorous, and crepitant rhonchi—Pleural friction murmur—Recapitulation	34
---	----

CHAPTER VI.

THE SECOND STAGE OF PHTHISIS.

Increase of physical signs previously described—Humid crackling rhonchus	46
--	----

CHAPTER VII.

THE THIRD STAGE OF PHTHISIS.

Increase of physical signs previously described—Cavernulous rhonchus—Percussion-sound of cavities: amphoric resonance: cracked-pot sound—Cavernous respiration—Amphoric respiration—Cavernous rhonchus—Metallic tinkling and echo—Pectoriloquy—Cavernous cough—Amphoric voice and cough—Pneumothorax—Hydro-pneumothorax	56
---	----

CHAPTER VIII.

ACUTE PHTHISIS ; AND TUBERCULAR LARYNGITIS.

Physical signs of acute phthisis ; and of tubercular laryngitis	76
---	----

THE
PHYSICAL SIGNS
OF CONSUMPTION.

CHAPTER I.

INTRODUCTORY.

Connexion of physical signs with general symptoms—

Relation of the thoracic and general conformation to the development of consumption.

THE separation of the physical signs from the general symptoms of phthisis, must be regarded only as a convenient mode of studying either the one or the other. In practice, the two are inseparable; and any diagnosis which is not based upon a careful consideration of both, is likely to prove fallacious. Auscultation is, in fact, merely the application of another sense to the practical investigation of disease.

Phthisis is as much a general as a local—a constitutional as a pulmonary affection. At its

very commencement, indeed, it is purely a constitutional one ; and a person may really be consumptive without having any thoracic malady at all. It is quite true that the stage preliminary to that of the lung affection is generally too brief or too indistinctly marked to be detected ; but, of its existence, few at the present time are altogether sceptical. The origin, the progress, the issue of the disease, alike point to the great probability of its reality ; and analogy affords a strong argument in its favour. Tubercle in the lungs is, as I have elsewhere expressed it, but the effect of phthisis ; and bears precisely the same relation to it as lithate of soda does to gout, and sugar to diabetes. Throughout the whole course of phthisis, indeed, the truly consumptive symptoms are not dependent upon either the amount or the state of the pulmonary tubercle.

From this view of the subject, it is manifest that consumption in its earliest condition—at its dawn, as it were—is not always discoverable by an examination of the chest ; and that the physical signs of the disease may present themselves in connexion with every possible variety of general symptoms.

There are a few points in the general physical characters of phthisis which demand attention.

The shape of the chest is popularly, and, even to some extent among the medical profession, considered to be closely connected with the tubercular diathesis; an ill-formed thorax, or a “pigeon-breast”, or a spinal curvature, being looked upon as landmarks of consumption. I am satisfied, however, that such a notion is altogether groundless. Amongst the patients of the Consumption Hospital, a really badly-formed chest is anything but common. The pigeon-breasted deformity is very rarely seen; lateral curvature is occasionally met with, but not more frequently than in a general hospital; whilst angular curvature—and this is the more remarkable since this variety of disease is generally, if not always, of scrofulous origin—is very rare indeed, so much so that I remember but one instance of its occurrence.

I shall briefly allude to one or two practical points which have a bearing upon this question. Consumption, for example, is a very frequent disease amongst soldiers, whose selection greatly depends upon, and whose subse-

quent discipline must materially contribute to, a well-formed chest. I have seen very many cases amongst Life-Guardsmen. A person, considered one of the best models at the Royal Academy, has lately been under my care, and is now the subject of advanced consumption. The smith and labouring mechanic, whose daily avocations tend to expand and develope the chest, are also very frequently consumptive, and form a large proportion of the applicants at the Brompton Hospital; appearing to be quite as liable to phthisis as those whose occupations have an opposite tendency. From many observations, indeed, bearing upon this subject, I have long been convinced that the form of the chest has little, if anything, to do with the development of tubercle; and that whenever a misshapen thorax occurs in connexion with phthisis it is accidental, and can only be regarded as one of the evidences of that defective state of the general health under which the tuberculous diathesis may have had its origin.

Certain peculiarities of general physical conformation also have long been popularly associated with consumption. But upon this point,

as upon the last, there is much error. Every variety of stature, form, and physical development, is found in connexion with phthisis. It is a mistake to suppose that the spare and the apparently delicate are the singled out victims of this dread malady. I am now attending a consumptive gentleman who is above six feet in height, and more than fourteen stone in weight; and others originally quite as robust have several times come under my notice. Even the generally recognized distinctions of temperament offer no assistance in the diagnosis; the greatest possible variety in this respect being constantly seen amongst consumptive sufferers. In all these particulars, indeed, there is nothing in phthisis which is not as often met with in many other and very different diseases.

CHAPTER II.

THE FIRST STAGE OF PHTHISIS.

The situation of tubercle—The earliest signs of pulmonary tuberculosis—Morbid changes in the respiratory murmurs.

THE apices of the lungs are the chosen seat of tubercle ; and, except occasionally at an advanced stage of consumption, the morbid deposit rarely extends to the bases of these organs. In some cases of acute phthisis, however, the tubercular substance is pretty equally scattered throughout the lungs ; but even then it usually runs a more rapid course in the apices than in the lower parts. Many pathologists have stated that the left side is much oftener attacked than the right ; but, from my own observations

upon a thousand cases, it appeared that, although the numbers were slightly in favour of the left lung, the difference was so small as to make it a matter of curiosity only, and not of the slightest practical value in diagnosis.* It seemed, nevertheless, from the excess of cases in which softening and vomicae were noticed on the left side, that the tubercular deposit is disposed to run through its several stages more rapidly on this side than on the other.

It is, consequently, about the summit of the chest that we are to look for the morbid changes announcing incipient tuberculosis of the lung.

The physical signs of consumption have their different stages as distinctly marked, and pass as regularly from one to the other, as the general and more visible symptoms of the disease. They may be divided into first, second, and third stages: the first corresponding with the miliary and crude tubercle; the second with its period of softening; and the third with its elimination and the formation of cavities.

* On Consumption: its Nature, Symptoms, and Treatment. 2nd edition, p. 20.

What is the earliest sign of pulmonary tuberculosis? This question, one of the most important which can present itself to the physician,—since the efficacy of medical treatment in consumption is in direct proportion to the period at which it is discovered,—has been variously answered by different writers. Flattening of the thoracic walls, diminished mobility of the chest, dulness on percussion, feebleness or harshness of the respiratory murmurs, bronchophony, increased vocal fremitus, murmurs in the pulmonary or subclavian arteries, increased audibility of the heart-sounds, have, one or more of them, been looked upon as the most trustworthy heralds of the coming danger. My belief is that there is no one particular sign which can be invariably regarded as either the earliest, or the most important.

It is obvious that the great differences met with, both in the amount of tubercle deposited, and in its effects upon the surrounding lung, as well as the different influences of such conditions determined by the individual peculiarities of patients, must always render the first sign of the local disease variable. From my own observa-

tions, however, I should say that, in the great majority of cases, a change in the respiratory murmurs is the earliest and surest sign of incipient tuberculosis; and on this account I shall speak of it first.

The inspiratory murmur over the affected part may be, *as compared with the other side*, weak, harsh, jerking, or bronchial; or the expiration may be prolonged. The first two are most commonly met with; jerking respiration is not so frequent, nor is it often heard quite so early; and bronchial breathing, although sometimes audible at an early period, is a more usual attendant of advanced tuberculosis. Prolonged expiration is a frequent and very important sign.

Simple *weakness*, without any other alteration in the character of the murmur, may be found over the whole apex, or only in parts; in some instances, the weakness passes almost into an absence of respiratory murmur, but I have never met with a case of its entire suppression, that is to say, in which a sound more or less audible did not occur during forced breathing. Weakness of respiration may remain for almost any length of time. In unfavourable cases, it gra-

dually passes into one of the other morbid types ; but where tubercle is quiescent, and the disease latent, it may become a persistent condition. I have seen many instances in which simple feebleness, combined perhaps with slight harshness of respiration, constituted the only evidence of former mischief.

As a general rule, the most trustworthy observations are those which are made during ordinary respiration ; but when, as frequently happens, the breathing is naturally somewhat feeble on both sides, weakness, as well as other morbid changes perhaps otherwise inappreciable, may often be made apparent, if the chest be listened to whilst the patient is taking some deep and evenly performed inspirations.

It is very rare indeed for tubercle to be so equally deposited in each lung as to cause a morbid weakness of breathing to be overlooked, in consequence of it being present to a precisely equal degree, and at precisely corresponding places, on each side. The possibility of such an occurrence, however, should not be lost sight of, and should be guarded against by carefully estimating other physical signs.

Harshness is a quality which may be combined with the preceding; or the breathing may be simply harsh, without being otherwise changed in its character. In true harsh respiration, the soft and *breezy* nature of the murmurs is lost, and both the inspiratory and expiratory sounds are rough, dry, and somewhat blowing. The more such qualities are developed, the more extensive and advanced is the local mischief. In favourable cases, harshness slowly subsides, and usually gives place to a general feebleness of the respiratory murmurs; but in cases of unfavourable tendency, it gradually increases, and after a period of uncertain duration, either passes imperceptibly into the bronchial type, or becomes associated with, and frequently masked by, certain secretion sounds, to be spoken of presently.

Prolongation of the expiratory murmur may, or may not be combined with the weak, harsh, or jerking varieties of respiration; but the association indicates a rather more advanced condition of local disease. The expiration, however, is seldom much increased in length without being also changed in quality or intensity;

sometimes it is louder than in health, at others harsh, or slightly bronchial.

The degree of prolongation which may be considered morbid, is a point open to differences of opinion. In healthy breathing, the act of expiration is, in many persons, unaccompanied by sound ; and even when an expiratory murmur is audible, it is always considerably shorter and less loud than the inspiratory. Whenever the sound of expiration, therefore, at the apex of either lung very closely approaches in length that of inspiration, it may be looked upon with suspicion ; and when it equals or exceeds it, it may, I think, be taken as evidence of more or less pulmonary mischief.

In some persons, the expiratory murmur is naturally a little more developed, and rather longer on the right than on the left side ; so that a slight difference beneath the right clavicle is less significant than a similar change in the other lung.

Jerking breathing is not so commonly heard at the very commencement of pulmonary tuberculosis as at a somewhat more advanced period of the first stage, and is, I think, indicative of a

tubercular deposit of some extent and rather scattered. It is very readily distinguished by the peculiar, divided, uneven, and somewhat harsh character of the inspiratory murmur; at once conveying an idea of the lung expanding under a difficulty which is overcome only by a succession of short and divided efforts. Its duration is very variable; but if it does not ultimately subside, it gradually passes either into very harsh or bronchial respiration.

Bronchial breathing, which is also easily distinguished by the peculiarly loud, harsh, dry, and blowing qualities of one or both respiratory murmurs, may be looked upon as presumptive evidence of phthisis, whenever it is limited to the ordinary seat of the tubercular deposit. Although more commonly met with at a later period of the disease, it may occur as an early sign, when the tubercular matter is rapidly and somewhat extensively deposited, or when it is quickly succeeded by pulmonary consolidation. The first stage, however, may be completely passed through without the slightest bronchial breathing.

It occasionally happens that the murmur pro-

duced by the air in its passage through the pharynx, either from unusual loudness or from some less evident cause, is heard in the infra-clavicular regions, and mistaken for bronchial breathing; but in such cases a similar condition invariably obtains on the opposite side, and may be made to disappear by the patient breathing with the mouth widely opened.

I may here briefly remark that, in examining a case of supposed phthisis, it is not sufficient to place the stethoscope upon one part only, as early tubercle may be very limited in position. The whole upper region of the chest, posteriorly as well as anteriorly, should be listened to, and *compared with the corresponding parts on the other side*. The very apices of the lungs, in front above the clavicles, and behind above the spines of the scapulæ, are too commonly neglected, although they often afford the first, and sometimes even the sole evidence of tubercular deposit.

It is important to recollect that the changes in respiration which we have been considering are not, *per se*, proofs of phthisis, since they merely indicate impaired function of the lung.

or an alteration in its physical condition, which may possibly arise from some other disease. For example :— *Weakness* of respiration is met with whenever any obstacle exists to the free entrance of air into the pulmonary cells ; hence it is common in bronchitis, emphysema, pneumonia, pleurisy, and pulmonary congestion, as well as in many nervous affections, such as asthma, hysteria, and pleurodynia. *Harshness* of breathing occurs whenever the surface of the bronchial mucous membrane has lost its natural smoothness ; hence it is found in the early state of bronchitis, as well as in emphysema, pneumonia, and pulmonary congestion. The *expiration is prolonged* by any mechanical impediment to the exit of air, or by diminished elasticity of the lung itself ; hence it is often met with in the latter stage of bronchitis, and attends most cases of pulmonary emphysema. *Jerking* respiration is often heard in incipient pleurisy, pleurodynia, and asthma, and is also of frequent occurrence in hysteria. *Bronchial* respiration is found in many cases of pleurisy, in pulmonary consolidation, and dilatation of the bronchial tubes.

Two circumstances are absolutely essential to the admission of these morbid changes as evidence of phthisis ; viz. (1) their limitation to the ordinary seat of tubercle ; (2) their confirmation by other physical signs, as well as by some one or more of the general symptoms of the disease.

CHAPTER III.

THE FIRST STAGE OF PHTHISIS (CONTINUED).

Changes in the form and movements of the chest—
Alterations in the percussion-sound.

NEXT in importance, perhaps, amongst the physical signs of pulmonary tuberculosis, are certain changes in the form and movements of the thoracic parietes. There is, however, much uncertainty in the time of their appearance: sometimes they are observable shortly after the commencement of the local deposit; at others, they are not evident until the tubercular disease is considerably advanced; and very often, they are delayed until the softening process has been established. The differences in amount of the tubercular deposit, and in its immediate effect upon the surrounding lung, sufficiently account for these variations.

In some few cases, a bulging may be observed

over the affected part at a very early period. This condition, however, being uncertain and transient, and limited to the very commencement of tuberculosis, may easily escape observation; and this accounts, perhaps, for its having been seldom noticed by medical writers. I have nevertheless seen it several times, and have found it an auxiliary in diagnosis. In such cases, I have come to the conclusion either that the tubercular deposit was considerable in amount, or that it was associated with emphysema.

The changes more commonly observed in the exterior of the chest, consist of a falling inwards and comparatively diminished antero-posterior movement of the affected region;—changes dependent upon contraction of the lung either from atrophy of some of the air-cells, or from secondary pleuritic, or pneumonic inflammation.

For estimating these changes, the chest-measurer may be usefully employed; but I am inclined to believe that the practised eye and the carefully applied hand are capable of affording every information worthy of influencing the diagnosis. The patient should be placed opposite the observer, who, if experienced, will at

once detect any difference in the form of the two sides. He should next be directed to inspire deeply, and having carefully watched the thoracic movement, the physician should then place his hands simultaneously on each side of the chest, when he will readily detect the slightest inequality in the antero-posterior expansion.

As the disease advances, the loss of healthy movement becomes more and more conspicuous, until, in some cases of long standing, although perhaps still in the first stage, the action of the whole chest becomes changed;—when the patient takes a forced inspiration, instead of the natural progressive swelling movement of the infra-clavicular regions, the chest is elevated as it were in a mass, the antero-posterior diameter of its upper part being very little if at all increased.

At some period—perhaps during the first stage, but oftener not until a more advanced condition of pulmonary disease—still further changes are usually noticed in the form of the thorax. The whole contour of the chest becomes altered; the cervical and dorsal vertebræ are inclined forward, and the shoulders are rounded;

the front of the chest is consequently contracted, the stature lessened, and an awkwardness given to the general appearance. If a patient in this condition be looked down upon whilst sitting, two curves are distinctly visible: the one affecting the whole course of the vertebræ; the other crossing it, and formed by the bending forward of the shoulders.

There is, of course, great diversity in the extent of these changes: sometimes they are manifest both to the patient and his friends; but very often only the eye of the physician can detect them. In regarding them as the index of tubercular disease, it must always be remembered that they can be safely employed only in conjunction with other evidence; since, not only are certain alterations in the form and action of the thorax observed in other diseases also, but, owing to causes either congenital or acquired, a great number of perfectly healthy chests have their two sides neither regular in shape nor precisely alike in movement.

Percussion next claims our attention. At the risk of being considered unorthodox upon this subject, I cannot help expressing my belief that

percussion is a far less certain aid to diagnosis than is commonly supposed. I am convinced, not only that a small amount of tubercle may exist in the lung without producing any sensible change in the percussion sound, but also that the tubercular deposit may be present even in considerable quantity, provided it be rather widely scattered, without at first causing any appreciable deviation from the healthy resonance of the chest. In children or young patients, such a condition is by no means uncommon. I have met with several instances of rapid and acute phthisis in children, where notwithstanding a percussion-sound during life, which neither myself nor others have regarded as morbid, the lungs after death have been found somewhat thickly studded with tubercles. In many such cases, there may have been a temporary hypertrophy of some of the pulmonary air-cells, or the natural sonorousness of the chest peculiar to early life may have been sufficient to counterbalance or mask the dull sound which would otherwise have occurred. In adult patients also, I have many times known the local disease unequivocally manifested by other signs, when the per-

cussion-sound has not afforded the slightest evidence of its existence.

In some cases, however, quite at the commencement of the disease,—and in all cases, sooner or later,—careful percussion will elicit a diminution in the resonance of the affected part, becoming gradually more and more evident as the local mischief increases. At the same time, the natural elasticity of the thoracic walls is sensibly lessened, and a peculiar feeling of resistance, gradually passing with the advance of the disease into complete hardness, is imparted to the pleximeter finger. This dulness and resistance are seldom equally developed, and seldom travel onwards *pari passu*, much difference being met with in their association. When the sense of touch is acute, the feeling of resistance may become of equal or even more use in diagnosis than the percussion-sound itself.

As in auscultation, so in percussion, it is necessary to examine every part of the infra-clavicular region, and carefully *to compare it with the corresponding spot on the opposite side*. The value of percussion, indeed, depends entirely upon this *comparative* examination, since

the healthy percussion-note varies very much in different persons. The supra-clavicular regions too often pass unnoticed, as do also the supra-scapular regions; both, however, are important parts, the earliest and sometimes even the sole evidence of the tubercular deposit being frequently found either in one or the other. In children, the inter-scapular region should not escape percussion, as it often happens that in young persons the bronchial glands are principally affected. Where tubercles are few in number or much diffused, a difference otherwise inappreciable may sometimes be detected by percussing over a large surface with the united four fingers of the right hand, the four fingers of the other hand being employed as the pleximeter.

The evidence afforded by percussion, no less than that by auscultation, requires to be corroborated by other symptoms. In certain emphysematous states of the lungs, the dilatation of the air-cells may be greater on one side than on the other; and by thus affording a different percussion-note on each side, may give to one apex the appearance of dulness. In the few cases

also in which idiopathic pneumonia or pleurisy has attacked the apices of the lungs, there may exist, even long after the disease has passed away, a comparative dulness beneath either clavicle. Diseases of the large blood-vessels, or cancerous growths, may likewise occasion a diminution of the natural sound and elasticity in the upper parts of the chest. It must also be remembered, although such cases are not sufficiently common to detract very much from the value of percussion, that a slight difference in the sonorousness of the two sides sometimes occurs as an individual peculiarity, altogether unconnected with disease. We have, in fine, the important conclusion again forced upon us, that no physical sign should be taken separately ; but that each one, however striking, should only be used either to confirm or confute the rest.

CHAPTER IV.

THE FIRST STAGE OF PHTHISIS (CONTINUED).

Vocal and tussive fremitus—Bronchophony and bronchial cough—Morbid extension of the heart's sounds—Arterial and venous murmurs.

WHEN the hand is lightly applied to the apex of a tubercular lung, and the patient is directed either to speak or to cough, there will frequently be noticed a peculiar vibration or *fremitus*, depending upon increased conducting power of the part immediately beneath. Owing, however, to the varying degrees and conditions of pulmonary condensation, as well as to differences in the circumstances naturally favouring its production, as met with in different individuals, the period at which this sign may present itself is very uncertain. Sometimes it is early and well marked; but quite as often it is either absent, or too feebly developed to merit much attention.

For my own part, I seldom employ it, believing that it can scarcely exist before the lung is sufficiently consolidated to give rise to other and far less equivocal indications of disease.

In making use of this sign as a guide in diagnosis, it should be remembered that vocal fremitus is met with in most healthy individuals, and that it is subject to much variation both in extent and degree; the natural tone of the voice, the distance of the bronchial tubes from the surface, and the general form of the chest, considerably modifying its development. It is always more distinctly marked in thin than in fat or muscular persons; is generally greater throughout the right than the left lung; and always more marked in the right than in the left infra-clavicular region. From the latter circumstance, it is evident that its use in diagnosis is necessarily limited, and that it is scarcely available except in examining the left side of the chest, since it must often be difficult to determine whether its full development beneath the right clavicle be morbid or not.

We may, I think, conclude that whenever there is an equal amount of vocal fremitus in

both infra-clavicular regions, the left side *probably* is diseased; and that whenever the vibration is greater on the left than on the opposite side, it is *almost certainly* so.

Bronchophony is, perhaps, of all signs the one most commonly employed, and the most trusted in the diagnosis of consumption;—a circumstance, I think, less attributable to its own merits than to the comparative facility with which it may be used. For the perfect development of morbid bronchophony, there must be a considerable degree of pulmonary condensation, associated with a naturally rather loud tone of voice. On this account, it is very common to meet with most unequivocal proof of pulmonary tuberculosis unaccompanied by bronchophony; whilst it is scarcely possible to find bronchophony of a morbid character unassociated with other well marked evidence of pulmonary consolidation. I have long been in the habit of employing this sign only as an occasional auxiliary, when it has seemed that the diagnosis must be based upon the concurrence of a number of physical changes, rather than upon the well defined character of any one in particular.

In estimating the importance of bronchophony, it must not be forgotten that it occurs as a *healthy condition* in many parts of the chest. In nearly every one, it may be heard on the sternum, above the clavicles, and between the scapulæ. In most persons, it exhibits itself as a distant and indistinct sound over the chest generally; being louder in the upper than in the lower regions, and before than behind, and more distinct in the right than in the left lung. There is much variety in all these particulars; but it seems to be an invariable rule that whenever natural bronchophony is heard in the infra-clavicular regions, it is louder upon the right than upon the left side.

Morbid bronchophony varies in intensity, and is sometimes so loud as to be positively painful to the ear; but in general character, it is not distinguishable from the natural type. As applied to the diagnosis of phthisis, I have found the following rules useful.—If there be an equal amount of bronchophony in both infra-clavicular regions, the left one is *probably* morbid; and if there be a positive excess in the left side, it is *almost certainly* so; a greater development of

vocal resonance, however, on the right side, is no indication of tubercular deposit, although it may be looked upon suspiciously should the excess be very highly marked.

In the majority of instances, morbid bronchophony is accompanied by bronchial respiration ; but this is not necessarily the case, as it is often distinctly marked when the breathing is simply weak, harsh, or jerking.

If a person exhibiting bronchophony, instead of speaking, be directed to cough, a sound (*bronchial cough*) varying in intensity, and often painfully loud, will be communicated to the ear. Similar remarks apply to this as to the bronchial voice or bronchophony ; and, for the same reasons, it may be estimated in like manner and tested by similar rules.

There are certain physical signs connected with the *heart and circulation*, which, although uncertain in their occurrence and equivocal in their signification, may nevertheless be occasionally brought into use as auxiliaries.

The application of the heart's sounds to the diagnosis of phthisis, rests upon the general law that in the left infra-clavicular region of a per-

feetly healthy chest, they are rarely sufficiently loud to interfere with the auscultation of the breathing, and would generally escape observation unless particularly attended to ; whilst in the corresponding part of the right side, they are very much more feeble and sometimes quite inaudible. Should there be, however, any consolidation of either apex, the cardiac sounds may be conducted with more or less intensity to that particular spot.

If the sounds of the heart, therefore, be *more distinctly* heard beneath the right than the left clavicle, there is good reason to conclude that some consolidation at the apex of the right lung is compensating for its greater distance from the seat of their production ; and even if the cardiac sounds be heard only *equally well* in both of these positions, there are fair grounds at least to suspect some local mischief upon the right side.

It is obvious that this sign is chiefly, if not exclusively applicable to the detection of disease in the right lung ; since, however much it may be developed at the apex of the left lung, it is very likely not to be morbid, but the result either of some peculiarity connected with the

conformation of the chest, or of unusual intensity of the sounds themselves.

It is important, moreover, to recollect that when the heart's action is increased,—as in many cases of dyspepsia, hysteria, and other nervous affections, as well as in cases of real disease either of the heart or of some of the larger blood-vessels in its immediate neighbourhood, the cardiac sounds may be conveyed a long distance from their source, and may even be distinctly heard over the entire chest; so that it is only in cases in which the organs of circulation are known to be neither functionally nor organically affected, that this sign is of the least value in the diagnosis of phthisis.

A subclavian murmur, usually of a soft and blowing character, is occasionally heard in pulmonary tuberculosis even at an early stage, in consequence of the subclavian artery being more or less pressed upon by the indurated or contracted lung. When, however, we consider that the very circumstance essential to the production of such a murmur implies a condition of local disease sufficiently advanced to give rise to other and less doubtful proofs of pulmonary

mischief; and when we remember, too, that vascular murmurs are common in a number of other and very different disorders, it is evident that the importance of this sign cannot be very great. Taken separately, indeed, I believe it to be valueless; but whenever a murmur limited to either subclavian artery is added to other suspicious indications, and when, as frequently happens, the diagnosis can only be based upon a number of doubtful or imperfectly developed signs, it may sometimes be of service as an auxiliary. For example,—I have met with cases in which, perhaps, slight feebleness of breathing, or trifling differences in the percussion-sound, have been rendered more important by the addition of a subclavian murmur; the combination probably having justified a diagnosis which subsequent events proved to be correct.

I have noticed in a few cases of early phthisis that a subclavian murmur, inaudible during ordinary breathing, became manifest at the end of a deep inspiration, and remained so until the lung again contracted; in these instances, the indurated portion of pulmonary tissue during

the lung's expansion, was probably brought into contact with the subclavian artery.

A murmur in the pulmonary artery is not an uncommon attendant upon tuberculosis affecting the apex of the left lung, and, although more frequent during the later stages, is sometimes heard at quite an early period of the disease. In consequence, however, of the murmur as it occurs in a tubercular case, being in no respect distinguishable from that so frequently heard in simple anæmia, this sign is of no value by itself, although, like the preceding, it may occasionally be of use by giving greater weight to others.

CHAPTER V.

THE FIRST STAGE OF PHTHISIS (CONCLUDED).

Dry crackling, subcrepitant, sibilant, sonorous, and crepitant rhonchi—Pleural friction murmur—Recapitulation.

THE earliest signs of pulmonary tuberculosis consist chiefly of changes which have been already considered; sooner or later, however, certain *rhonchi* or *râles* are developed in the seat of the tubercular deposit.

Chief of these is the *dry crackling rhonchus*, since it is at once diagnostic of tubercle. The rest, viz., the subcrepitant, sibilant, sonorous, and crepitant rhonchi, although often of great value in diagnosis, are of less import, being dependent upon inflammatory action, which may or may not arise from the presence of tubercle.

The *dry crackling rhonchus* is a short, dry, sharp, crackling sound, heard chiefly, but not

quite exclusively, during the inspiration. Its mechanism has not hitherto been satisfactorily explained; but it has been so universally and exclusively found to co-exist with tubercles, as to leave no doubt of their relation to each other as cause and effect. The number of crackles varies; sometimes there is but one with each inspiration; at others, there are two, three, or even four. They are seldom heard at the very commencement of the first stage, but seem to denote rather an advanced, and advancing condition of the tubercular deposit. When once fully developed, they are generally persistent, and may be heard at nearly every subsequent examination, if not on tranquil at least on forced inspiration, until at length they pass insensibly into the *humid* crackling, which, as a sign of the second stage of consumption, will be spoken of in the next chapter. The dry crackling rhonchus either does not attend every case of phthisis, or it lasts too short a time to be detected; for I have watched many cases through their whole course without noticing it. Its duration is always variable: in some persons it is very rapidly transformed; in others it re-

mains some little time, seldom, however, more than a few weeks. The longer it continues, the louder and larger does it become, and the more liable to be heard with the expiratory murmur. It is, under any circumstances, an unfavourable sign, denoting the passage of tubercle from a state of latency to one of more or less activity.

The dry crackling differs so essentially from every other rôle, that it only requires to be heard a few times to be ever afterwards recognized. The subcrepitant rhonchus, or, as it is termed by some, "large crepitation," is the only one for which it can be mistaken. The distinction, however, is sufficiently easy. The one is small, dry, clear, and *crackling* in its character; the other larger, moist, and *bubbling*.

Of the other rhonchi met with during the first stage, the most important is the *subcrepitant*, produced by secondary bronchitis in the smaller or capillary tubes. The value of this sign, however, is altogether dependent upon its position and the symptoms accompanying it, since, precisely the same rhonchus also results from idiopathic or non-tubercular bronchitis. It

is easily distinguished by its moist, bubbling character already adverted to.

The time of its development is subject to much variation ; sometimes it is met with at an early period of the first stage, but more generally it is delayed until the tubercular deposit has existed some little while. It is of all rhonchi the most common, there being few, if any cases of phthisis which fail to exhibit it at some period or other. Sometimes the râles are small, few, and limited in position ; sometimes they are larger, more abundant, and scattered ; indeed, great variety is met with in this respect, according to the extent and severity of the accompanying bronchitis.

Subcrepitant rhonchus, when secondary to tubercular deposit, usually occurs either in one lung only, or is more developed in one lung than in the other, and principally occupies the apices of these organs ; but when it is dependent upon idiopathic inflammation, it is generally present in both lungs, and in a nearly equal degree, and is principally, if not exclusively, located at their bases. The distinction, therefore, between a local and a general capillary bronchitis is, for

the most part, quite as easy as it is important. A local capillary bronchitis, indicated by more or less subcrepitant rhonchus limited to the apex of a lung, may be almost certainly pronounced to be dependent upon tubercle.

It occasionally happens that consumptive persons are attacked with capillary bronchitis, severe in its character, and pervading both lungs. In some such cases, the greater prevalence of subcrepitant rhonchus at the apex than at the base of these organs, points at once to the diagnosis; but when, as frequently occurs, the râles are somewhat equally diffused, it is very difficult and, perhaps, impossible, during the height of the attack, to detect the tubercular disease. But as the inflammatory symptoms decline, the difficulty is generally removed; the subcrepitant rhonchus instead of disappearing last, as in the idiopathic variety of bronchitis, at the bases of the lungs, lingers about their apices, and thus tells of the tubercular complication.

Sibilant and sonorous rhonchi—likewise indicative of bronchitis, but situated in the larger bronchial tubes—are often met with in phthisis, as well in its early, as in its later stages. In

consequence, however, of the purely local bronchitis of tubercular irritation being generally situated in the smaller or capillary tubes, when these rhonchi occur, they are seldom limited to the lungs' apices, but are more or less scattered throughout the chest—denoting, in fact, a general and not a local form of bronchial inflammation. Very often they are associated with local or general subcrepitant râles; in either case—especially the latter—indicating an extensive and severe amount of bronchitis.

Far from aiding in the diagnosis, these larger rhonchi tend oftener than not to complicate it, by obscuring or changing the quality of the respiratory murmurs. When this is the case, it is safer not to hazard a decided opinion as to the presence, or otherwise, of tubercles until the bronchial attack is subsiding. If the rhonchi be then found to linger about the upper parts of the chest, there is, very probably, tubercular complication; the sibilant and sonorous râles of idiopathic bronchitis being generally last heard about the bases or the middle of the lungs.

It nevertheless happens occasionally that a sibilant rhonchus of a strictly local character is

heard at the upper part of the lung. Such a circumstance is certainly uncommon ; but when it occurs, may be regarded as strong corroborative evidence of the presence of tubercle.

Crepitant rhonchus, or the “fine crepitation” of pneumonia—consisting of a number of minute, clear, dry, and crepitating sounds, precisely resembling each other, and regularly and rapidly produced—is comparatively rare in the seat of tubercle, simply because the local inflammation caused by the morbid deposit is much more frequently situated in the smaller bronchi than in the substance of the lungs ; and when the latter is involved, it would seem to be more generally in a state of congestion than of actual inflammation. In the few cases where it is met with, the first stage is usually rather advanced, the respiratory murmurs being sensibly altered, or the percussion-sound more or less dull. It is an unpromising sign ; far more so than the subcrepitant rhonchus of capillary bronchitis. Viewing it in relation to diagnosis, it must always be taken in connection with other physical signs ; since, primary or idiopathic pneumonia, although usually seated in

the middle or lower parts of the lungs, may possibly attack their apices.

Pleural friction murmurs localized to the seat of tubercle are uncommon during the first stage of phthisis. The acute pains so often felt at this period are unquestionably often due to local plenrisy; but whether from its evanescent nature or from other causes, a friction-sound is seldom met with at the seat of pain. In the few cases where I have detected it in connection with tubercle, other signs had sufficiently indicated the phthisical condition, and the local disease was considerably advanced. Pleural rubbing is nothing more than a help to diagnosis, rare in its occurrence, and usually an unfavourable indication. Like the fine crepitation of pneumonia, it requires to be considered in relation to other signs, since primary or idiopathic pleurisy also sometimes attacks the upper regions of the chest.

Having now completed the consideration of the physical signs of the first stage, I would again observe that the greatest variety will be encountered in their development and association. One patient may afford sufficient proof of

the disease chiefly by the character of the respiration ; another, by that of percussion, or by the presence of rhonchi ; a third, by thoracic vibration and vocal resonance ; and a fourth may have several or even all of these combined.

But I would again urge the necessity of not regarding any one sign as evidence of tubercles unless it be found to harmonize with others, as well as with some of the general symptoms of consumption.

It may be useful to recapitulate briefly all that we have hitherto discussed ; and, perhaps, this cannot be done better than by describing an imaginary case of phthisis in its first stage.

We will suppose that a person presents himself with some one or more of the general symptoms of consumption, but too obscurely and equivocally marked to determine the nature of his malady. Upon examining his chest, it is possible that there may be a slight bulging beneath one of the clavicles, but more probable either that there is no visible difference in the two sides, or that one infra-clavicular region is somewhat depressed. Either of these excites suspicion, but is not sufficient to justify any

conclusion, and we proceed further. We watch the ordinary movements of the chest, and afterwards direct the patient to take some full inspirations, when, perhaps, the upper regions of the two sides are not expanded equally; and if the diminution correspond with either of the preceding signs, there is reason to suspect phthisis; but as it may happen that no very evident difference is discoverable, or that the change is too trivial and uncertain to be depended upon, we proceed with our examination. Upon the suspected part we place the hand lightly whilst the patient speaks, when perhaps we may discover an increase of vocal fremitus;—or we ascertain whether the heart's sounds are unduly conducted to that point, recollecting that the former sign is chiefly available on the left, and the latter on the right side;—or we listen for a murmur in the subclavian artery, taking care, however, not to place too much reliance on its discovery. One or more of these will probably strengthen the idea of the case being tubercular; but we still need further proof.

We next percuss, and find, perhaps, more or less dulness and resistance above, upon, or be-

neath the clavicle, or in the upper scapular region.

The stethoscope now comes to our assistance to determine the value of the previous signs; the respiration is found perhaps weak, harsh, or jerking; or, the expiration is prolonged beyond a healthy limit; or, perhaps, the case is sufficiently advanced to render the breathing somewhat bronchial.

We have now scarcely any doubt of the patient being phthisical, yet, should we discover a morbid degree of bronchophony or of bronchial cough, or a localized friction murmur, or the fine crepitation of pneumonia, the case will be still more decided. Should there be a few subcrepitant rhonchi about the lungs' apex,—the indication, as already explained, of a local capillary bronchitis, the evidence is yet more complete. But, should we hear the dry crackling rhonchus, it would be at once decisive.

It might happen, perchance, that the case is not quite so simple, in consequence of our patient suffering at the time from general bronchitis either of the larger or smaller tubes, or both, which either lessens or destroys the value

of many of the signs. Should this be the case, we must not be too hasty in our diagnosis, but wait until the attack is declining, and then notice whether it lingers about the apices of the lungs, which is pretty sure to happen should it be engrafted upon tuberculosis.

It must not be supposed that in practice it is necessary to go thus minutely into every case. To do so would be scarcely less wearisome to the physician than to the patient. It is sufficient to make out distinctly some of the more important signs, and to examine and compare them with the general symptoms.

CHAPTER VI.

THE SECOND STAGE OF PHTHISIS.

Increase of physical signs previously described—Humid crackling rhonchus.

AN acquaintance with the physical signs denoting the commencement of the second stage, or that of tubercular softening, is of great importance, because under favourable circumstances it sometimes happens that the first stage extends over months or even years ; but so soon as softening begins, the disease commonly progresses in an increased ratio, and medical treatment becomes less effective.

Although about this time the general symptoms usually declare a considerable advance in the malady, there is nothing about them to point out with any degree of certainty, even to the most practised observer, the real state of the lungs—a circumstance showing at once the value of physical examination.

Of the majority of signs attending the second stage little more is requisite than a brief enumeration, since, with a solitary exception, they chiefly consist of a greater and more unequivocal development of those already explained as belonging to an earlier period. But even in this respect there is great diversity. Sometimes an amount of hard tubercle, too small, or too brief in its duration, to have given rise to any well marked physical sign, suddenly undergoes transformation; at other times, the tubercular deposit has accumulated to such an extent, or has existed sufficiently long, to have produced decided evidence of extensive pulmonary disease, long before the softening process sets in.

Taking, however, the ordinary run of cases, a patient in the second stage of phthisis,—in addition to the impaired movement and altered configuration of the thorax generally, which has already been described,—will exhibit the infra-clavicular region of one side unmistakeably flattened and less capable of expansion during ordinary and forced breathing than the other. If the hand be applied to that part, both vocal and tussive fremitus will be found highly marked.

On percussion, the affected part will exhibit more distinctly than formerly both dulness and resistance; or it will present that peculiar, hard, heavy, incompletely dull, and somewhat jarring sound which has been so aptly termed *wooden*.* The respiration will probably possess some of the morbid characters already described—most frequently it will be found harsh or bronchial. The sounds of the heart will often be unnaturally loud on the diseased side; and bronchophony and bronchial cough will be much more developed. Some of the rhonchi, indicative of secondary inflammation, will very likely be present; the subcrepitant, or that of capillary bronchitis, being by far the most common.

* The wooden percussion-sound, as a general rule, is not thoroughly developed until about the middle period of phthisis; but to this there are numerous exceptions. Sometimes it is well marked long before the commencement of the second stage. An extensively, but still incompletely consolidated lung, more or less adherent to the thoracic wall, seems to be essential to its production; it never attends either simple pneumonia or pleuritic effusion, requiring for its development a certain amount of air in the pulmonary substance. It is generally made more evident by the mouth of the patient being kept open during the act of percussion.

Such a catalogue of symptoms is given merely to show what may be expected, to a greater or less degree, in the majority of cases. Much variety will be found in their association; and none of them can be regarded as any proof of the tubercles having softened. I sometimes meet with patients, unquestionably in the second stage of phthisis, who so slightly exhibit these symptoms, that were it not for other indications, even the tubercular nature of their disease might easily be overlooked; whilst, on the other hand, I as often meet with those in whom they are so strongly developed, as to lead to the suspicion of a stage even more advanced.

We look in vain for any line of separation between the first and second stages of consumption. The one glides insensibly into the other; the only difference between them consisting in the altered state of the tubercular deposit.

Fortunately there is nothing easier than to detect even the very beginning of the softening process. The *humid crackling* rhonchus,—a sound so peculiar as to be readily distinguished,—has only to be heard at the seat of the disease, and the evidence is complete.

A knowledge of this rhonchus, therefore, being so important, I may be excused for entering rather minutely into its description. It is a moist, sharp, clear, *clicking* sound, occurring generally only once or twice, but sometimes three or even four times, chiefly, but not exclusively, with the inspiration. It varies in intensity, being sometimes scarcely audible, at others loud and clear. Under whatever circumstances, however, it may be developed, it never loses its *clicking* character; so constant, indeed, is this, that I am in the habit of designating the rhonchus—the *humid click*. There is but one other rhonchus for which it can be mistaken, and that is the subcrepitant; the difference between them is, however, sufficiently obvious, the one being *bubbling*, the other *clicking*. The two are often associated, but even then it is quite easy to distinguish them.

The *humid* crackling commonly has its origin in a gradual transformation of the *dry* crackling rhonchus; but this is not necessarily the case. The dry crackling always passes into the humid; but the latter sometimes commences independently, and without being preceded by the other.

Of the accuracy of this statement, I have had several opportunities of satisfying myself.

I might illustrate, in various ways, the value of this rhonchus; but one may suffice. I was once puzzled by seeing a patient suffering under most of the general symptoms of advanced phthisis, but in whose chest I failed to detect tubercular disease, simply because it was at first carefully looked for only in the ordinary place of its occurrence, viz., the apices of the lungs. Upon examining their bases, however, the percussion-sound at the very lowest part of the right lung was found to be quite dull, whilst only two inches above this, it seemed to be tolerably natural. The respiration was entirely absent where the sound was dull, except on deep inspiration, when it was strongly bronchial; whilst at a point scarcely three inches from the very base, it was hardly changed from that of health, all the rest of the lung seeming to be quite sound. There could be no doubt from such signs, that there was a very limited consolidation at the base of the right lung; but it became a question, whether this depended upon chronic pneumonia, or tubercular deposition out

of its usual locality. The decision was evidently of no little importance to the patient, since, the treatment which might cure the one, would certainly only increase the other. The difficulty was at once solved by auscultation; two or three *humid clicks* were to be heard with each inspiration, and tubercular softening was the diagnosis. Subsequent events proved its correctness, for, in the course of but a very few weeks, there were all the physical signs of an extensive vomica in the place of the former dullness, and the patient ultimately died of phthisis.

The mechanism of the *humid click* is as little understood as is that of the *dry* crackling rhonchus; but for all practical purposes this is immaterial; it is sufficient to know that, under all circumstances, it tells of softened tubercle. The duration of this rôle is variable; but after a time it becomes larger, louder, more humid, and more or less *metallic* in its quality, and ultimately passes into the cavernulous or the cavernous rhonchus, which characterizes the third stage of the disease.

After softening has begun, as well as during the whole of the second stage, the neighbourhood

of the tubercular deposit is more than ever liable to become the seat of inflammation. The capillary bronchial tubes being the parts most usually attacked, subcrepitant rhonchi are very frequently met with ; and although ordinarily limited to the neighbourhood of the tubercles, they are sometimes more or less scattered throughout the lung.

During the second stage, it is quite as rare as at an earlier period for the substance of the lung itself to be attacked with inflammation ; hence the fine crepitation of pneumonia is not often heard. The pleura, however, is rather more liable than formerly to secondary inflammation, so that pleural friction-sounds are occasionally audible.

The larger bronchi are somewhat more prone than formerly to inflammatory seizures ; sonorous and sibilant rhonchi are consequently not uncommon attendants, but they merely announce the presence of bronchitis, and are usually heard over the whole chest.

It will generally be found that the softening first shows itself at that part where there were the earliest signs of tubercle ; and that the

neighbouring portions of lung where there was formerly no appreciable deviation from healthy condition, will now exhibit more or less evidence of incipient tuberculosis. It would seem that there is about this period a great tendency to the further deposition of tubercle,—the effect, probably, of that same reduction of power in the patient, under which the earlier tubercles have undergone transformation.

Hence it generally happens that we can observe, in the same patient, the blending of the first and second stages, and at the same time, the distinctive marks of each. There is, perhaps, at the very apex of the lung a humid *click*, which may or may not be associated with the sub-crepitant rhonchus of capillary bronchitis; and still lower down a few dry crackles. The percussion-sound shows, perhaps, a corresponding gradation,—the dulness or the wooden note which was greatest at the summit gradually diminishing as we descend, until it becomes lost in the clear sound over the yet unaffected bases. The respiration is, perhaps, equally changed; being bronchial where the sound was dullest, and harsh, weak, or jerking lower down; until

in the inferior parts it is found nearly if not quite healthy.

We cannot, of course, expect to find every case thus clearly marked. Some patients will exhibit one change more than another, and we shall meet with almost endless variety in the grouping of the several signs; yet there will seldom be any practical difficulty in deciding upon the existence or otherwise of the second stage, since the presence or the absence of the *humid click* is amply sufficient to determine it. And thus we may rejoice that whilst the passage of the hard into the softened tubercle is of such great importance in connection with prognosis, nothing is easier than to detect it by auscultation.

CHAPTER VII.

THE THIRD STAGE OF PHTHISIS.

Increase of physical signs previously described—Cavernulous rhonchus—Percussion-sound of cavities: amphoric resonance: cracked-pot sound—Cavernous respiration—Amphoric respiration—Cavernous rhonchus—Metallic tinkling and echo—Pectoriloquy—Cavernous cough—Amphoric voice and cough—Pneumothorax—Hydro-pneumothorax.

THE third stage of phthisis, or that in which cavities exist in the lungs, is in general easily recognized by physical examination.

Although at this period of the disease, the general symptoms are often so conspicuous as scarcely to leave a doubt of the pulmonary condition, it is not very uncommon to find persons whose appearance, notwithstanding the existence of large vomicæ, is so deceptive, that without the aid of physical signs, the existence even of phthisis might not be suspected. Hence

it is that a familiarity with the signs of pulmonary excavations is of quite as much importance as that of the earlier stages.

There is no positive line of separation between the second and third stages ; one passes imperceptibly into the other, and cases sometimes occur in which it is difficult to decide between the two ; but so soon as there is proof of the smallest excavation, the third stage may be said to have commenced.

It is unnecessary to enter minutely into all the physical signs belonging to this period, because the majority of them merely consist of an increase of those already described. There is generally a visible falling inwards at the summit of one or both lungs, the antero-posterior diameter of one or both infra-clavicular regions being much decreased even to the naked eye ; and, on deep inspiration, the movement of that part of the chest, and often of the whole side, is sensibly diminished. On percussion, the sound is dull and flat, and very frequently presents the *wooden* character which I have already described ; the resistance of the thoracic walls being, at the same time, very highly marked.

There is, of course, much variety both in the degree and association of these changes, according to the previous duration of the disease, the amount of the tubercular deposit, and the pathological condition of the surrounding lung. But however well-developed such changes may be, it is manifest that they announce nothing more than an advanced condition of local disease, and that we must seek for further signs to show the actual stage of the tubercular affection.

It was mentioned in the preceding chapter, that the humid crackling rhonchus becoming gradually more moist, and assuming a *metallic* quality, passes almost insensibly into the *cavernulous*. This rhonchus is a clear, liquid, bubbling, and metallic sound, taking place both with inspiration and expiration, but especially with the former, and varying in loudness and frequency. It is easily recognized, and declares unequivocally the commencement of the final stage. There is generally associated with it either a bronchial or a very harsh and weak respiratory murmur; true cavernous breathing, as well as the other signs of excavation, not as yet

being developed. Its duration is very variable, being, of course, dependent upon the advance or otherwise of the softening process; sometimes it is too brief or too ill-defined to be recognized, the *humid click* appearing to pass abruptly into the true cavernous rhonchus.

With the formation of vomicæ arise new modifications in the percussion-sound, the respiration, the rhonchi, and vocal resonance, all of which must be examined separately.

Percussion-sound. Every variety of sound, from absolute dulness to that degree of morbid resonance which is termed amphoric, may attend percussion over a cavity, according to its size, position, and the state of the surrounding parts; the force employed, also, makes a considerable difference, since, if the stroke be gentle, the sound will proceed from the superficial, and if hard, from the deeper parts. Positive dulness, or else the peculiar *wooden* percussion-sound previously described, together with a resisting and inelastic state of the thoracic wall, is by far the most common. Cases now and then occur where the sound, in consequence of the morbid clearness of the cavity seeming to balance the

dulness of the neighbouring induration, is scarcely altered from that of health; and it is only by the sense of resistance to the percussion stroke, and the marked inelasticity of the thoracic walls, that the pulmonary mischief is made apparent. When the cavity is very large, and either seated close to the surface or separated from it by indurated lung or thickened pleura, the percussion note is often morbidly clear, or, as it is termed, *amphoric*,—a character very peculiar, and closely imitated by flapping the cheek when the mouth is inflated. Between the *wooden* and *amphoric* note there is no distinct line of separation, the former gradually and insensibly passing into the latter.

Whenever the percussion note has even the slightest approach to the amphoric quality, it frequently happens, especially if the stroke be given sharply and rather abruptly, that a new sound is developed, so peculiar in its character, as to decide at once the state of the case. Laennec first described this, under the name of “*bruit de pot fêlé*.” It is impossible by any description to do justice to its peculiarity,—it can only be learned by the ear; but it exactly resembles the

sound produced by striking an empty and cracked pipkin. For the perfect development of this *cracked-pot sound*, it is necessary that the cavity should be large, tolerably dry, and freely communicating with the bronchial tubes. The mouth of the patient should be widely opened whilst the chest is being percussed, and the head turned towards the auscultator. Except in very rare instances, there is no *bruit* if the mouth be kept closed. The bruit often ceases to be heard after the first percussion stroke, and can by no effort be reproduced until after an uncertain but sometimes considerable interval; occasionally it requires two or more strokes to produce this result; but even when most fully developed, it will generally be found that continued percussion fails to elicit it so distinctly as at first.

In simple contraction, attended with more or less consolidation of the lung, the percussion-sound sometimes closely resembles the *bruit de pot fêlé*; so closely, indeed, that it requires some amount of practical experience to distinguish the difference. The former, however, is only the *wooden* sound highly developed, and is more

dull, more resisting, less jarring, and free from the metallic and *ringing* character so distinctive in the *cracked-pot* sound. I have been accustomed to speak of it as the *pot sound* simply, the better to separate it from the real *cracked-pot* sound ; which I believe is at once diagnostic of pulmonary cavities, and never exists, at least in the adult, under any other pathological condition. To my ear, this bruit is always the prophetic knell of the consumptive sufferer. In young children, however,—the subjects of bronchitis or emphysema, and even in some few cases when in perfect health,—the natural percussion sometimes bears a very close, or even a complete resemblance to the cracked-pot sound ; so that, under such circumstances, this sign is useless in diagnosis, unless accompanied by other evidence of the presence of a vomica.*

Respiratory-sound. Cavernous respiration, which is in general easily recognised by its dry, hollow, blowing, and *metallic* qualities, usually commences in the gradual increase of the bron-

* For further observations upon this subject, see a paper by the author in the "Lancet" for April 1857.

chial type; but it may succeed any other morbid variety of breathing, or it may begin in spots, where scarcely any respiratory murmur could be previously heard.

Intense bronchial respiration sometimes closely resembles the cavernous; and the confusion of the two has often given rise to unnecessary alarm, and thrown undeserved discredit upon auscultation. To the practised ear, however, the differences between them are generally pretty evident; the one being rough and more or less blowing and diffused; the other, distinctly hollow and *metallic*. In the few cases where it may be rather difficult to distinguish them, and there is no secretion-sound to help the diagnosis, the chest should be listened to whilst the patient is either coughing or taking a forced inspiration, when, perhaps, a cavernous rhonchus may decide the question.

Where the cavity is of some extent, the respiration may assume the character termed *amphoric*, which is easily recognized by its close resemblance to the sound caused by blowing into an empty bottle. Amphoric respiration is generally, but not invariably attended by am-

phoric resonance on percussion, or by the *bruit de pot fêlé*.

It is a question of some interest, whether, from the quality of the respiration, we can form a tolerably correct estimate of the size of a cavity. To a certain degree, I believe it to be possible, by its loudness, tone, and extent; but where there is much surrounding consolidation, we may easily be misled by the sound of what is, in reality, but a small vomica, becoming more diffused. After a little experience, however, the respiratory sound becomes in a great measure the suggester of its place of origin; but to prescribe rules for such distinctions, would be utterly vain. How *small* a cavity may cause cavernous respiration, is a point upon which it is not easy to decide; much must, of course, depend upon its position,—but I have several times seen one diagnosed, which, after death, was found scarcely larger than a hazel-nut; although I believe that vomicae of this size will more generally pass undetected.

Cavernous breathing is sometimes temporarily absent, even in vomicae of considerable size. This may arise from several causes,—such as

the blocking up of the bronchial tubes opening into the cavity, or from the vomica itself being completely filled with its own secretion, or even from the feeble respiratory power of the patient. In cases, therefore, where, from the absence of this, as well, perhaps, as of other cavernous signs, we fail to detect a vomica, although other physical and general indications render its existence highly probable, it is a safe rule not to decide upon the actual stage of the disease until after a second, or even a third examination.

Coughing, or a few deep inspirations, will often develope the physical signs peculiar to cavities, when these had previously been either obscure or equivocal.

It is oftentimes by no means easy to detect the vomicae of very young children. In such little patients, the natural respiration over the entire chest is usually so loud and blowing that it is apt completely to mask the cavernous character of any particular spot. All the physical signs indeed, but especially those derived from percussion and the auscultation of the breathing, are, in young children, at their very minimum. Cavernous rhonchus, when it exists in these

cases, is, perhaps, the best help to diagnosis, being less likely than any other sign to be either obscured or overlooked.

The only condition at all likely to be mistaken for vomicæ, from the evidence afforded by cavernous respiration, is extreme dilatation of the bronchial tubes ; but this is a very rare disease, more common in the centre than at the apex of the lung, and in its general history and symptoms very different from the last stage of phthisis.

Rhonchi. Cavernous rhonchus has many varieties, according to the amount and consistence of the secretion, and the size of the cavity ; sometimes it resembles the bursting of large bubbles,—at others, the agitation of some thick and viscid substance—whence it is often termed *gurgling*,—and very frequently it is clear and *ringing*, appearing as though there were something actually *metallic* within the vomica ; but in all instances it conveys the idea of metallic hollowness, and can scarcely fail, even to the most inexperienced, to tell at once of the seat of its production. Its loudness varies in every possible degree ; not unfrequently it may be dis-

tinguished at some distance from the patient's chest; and sometimes it is heard by the patients themselves, enabling them to point out the situation of the cavity.

Cavernous rhonchus very often completely masks the cavernous breathing. Either of these may exist without the other; sometimes, indeed, the rhonchus is the sole evidence of the pulmonary cavity.

The secretion of cavities situated near the heart is sometimes so agitated by the action of this organ, as to cause a sensation compared by the patient to the ticking of a clock. If the cavity be large, this sound often appears to the auscultator to be very clicking and *metallic*, and is singular and characteristic.

Sometimes there is heard in vomicæ a peculiar plaintive creaking sound rather of a dry quality, and more like the sibilant than the cavernous rhonchus. Of its mechanism, I cannot form an opinion; but whenever I have noticed it, the pulmonary disease has been chronic and quiescent, and the cavity itself apparently undergoing contraction.

In some rare cases where the amphoric cha-

racter of the physical signs denotes a vomica of considerable size, when the patient coughs or speaks or breathes rather forcibly, and sometimes even when he is quite tranquil, *metallic tinkling* becomes developed.

It would be useless to enter into the many speculations as to the cause of this phenomenon ; it will suffice to state, that the sound exactly resembles the falling of a sharp metallic substance into a glass or metal jar ; and that it declares the existence of a hollow space containing a fluid. Sometimes it is attended by a peculiar and very characteristic vibration of a somewhat prolonged character, termed *metallic echo*.

My own experience would lead me to the conclusion, that true *metallic tinkling* is very rarely met with in tuberculous cavities, even when they are of very large size. Some auscultators consider it far from uncommon, but I much suspect that it is often confounded with the clear and metallic variety of cavernous rhonchus. The two certainly have some characters in common ; but it is only necessary to hear once the peculiar *ring* of metallic tinkling, as it occurs in some cases of hydro-pneumothorax, to distinguish the differences between them.

Vomicæ of the left lung frequently cause much disturbance of the heart's action, and in this way, add materially to the distress of the sufferer; in such instances, the organ is sometimes found considerably displaced, having apparently followed the lung in its progressive contraction.

Pleural friction murmurs are occasionally heard in the neighbourhood of cavities, but they are of course valueless as regards their diagnosis. Secondary pleurisy being at this period more than ever liable to occur in distant parts of the lung, friction sounds are also frequently met with where pain is complained of.

Vocal resonance. The cavernous voice, or *pectoriloquy*, is distinguished from bronchophony by the words being articulate, and seeming to arise from the stethoscope itself; so much, indeed, is this the case, that very often it appears as if the patient were actually speaking into the ear of the auscultator. For its perfect production it is necessary that the cavity should be only of moderate size, tolerably empty, not far from the surface, and communicating somewhat freely with the bronchial tubes. Unlike

bronchophony, the tone of the voice does not affect its development; "whispering pectoriloquy," or that produced when the patient whispers, being even more characteristic, although of course less loud, than that attending the natural voice.

Of all the signs of pulmonary excavations, I believe pectoriloquy is the least to be depended upon. Perfect pectoriloquy, indeed, is of very infrequent occurrence; and, unless it is perfectly developed, this sign is hardly to be distinguished from some of the varieties of bronchophony. The many circumstances just now spoken of as being essential to its production, sufficiently explain its rarity. I have seen more errors in the diagnosis of cavities from mistaken pectoriloquy than from any other cause. Very often it is entirely absent when other signs unmistakeably point out the existence of a vomica; whilst it is seldom, if ever, present, unless accompanied by other and better marked signs of the pulmonary excavation. For these reasons, therefore, I have long regarded pectoriloquy as a sign second in importance to many others, and have sought for it only on certain occasions, when perhaps other evidence has seemed incomplete.

In cases which exhibit pectoriloquy, the resonance produced by coughing is similarly modified, and we hear what is called the *cavernous cough*. This is a ringing, hollow, and metallic sound, apparently produced close to the ear, and often with sufficient intensity to cause a very painful sensation to the auscultator; it is of the same value in diagnosis as the cavernous voice, and, when fully developed, is, perhaps, even more characteristic.

When the cavity is of very large size, and under circumstances favourable to the production both of the amphoric sound on percussion and amphoric respiration, the resonance of the voice and cough very frequently is attended with still further modification. When the patient speaks, the voice, instead of being close to the ear and articulate, as in pectoriloquy, has more the character of bronchophony, but is hollow and metallic, and from resembling the sound produced by speaking into an empty vessel, is termed *amphoric voice*. Precisely the same quality of sound attends coughing, and the *amphoric cough* and *voice* will generally be found together.

Pneumothorax is an occasional complication of phthisis, and may occur at any time after tubercular softening has commenced, but is most usual at a rather advanced period of the third stage. Its physical signs vary according to its extent, and the pathological conditions with which it is associated. When there is much previous adhesion of the pleura to the thoracic walls, the escape of air may be very limited both in situation and amount ; but when the lung is less closely attached to the parietes of the chest, pneumothorax may be of a more general character, and even occupy more or less of the entire side.

In proportion to the extent of the pneumothorax there will be found a greater or less expansion or bulging of the intercostal spaces, together with lessened respiratory movement, and a morbidly clear or *tympanitic* sound on percussion. The respiratory murmur will in most cases be found either very feeble or else inaudible, but in some few instances it will be of an amphoric character—differences depending upon the kind of opening into the pleural cavity. When this is oblique, it may act the part of a

valve, and thus prevent the escape from, and the readmission of air into the newly opened cavity ; but when direct, the air freely passing in either direction causes the respiratory sound to be amphoric. In some cases these opposite conditions are found to alternate ; at one examination, the breathing being perhaps weak or suppressed, at another, amphoric. Feebleness or else deficiency of breathing sound is, however, by far the most common.

When the pleural cavity is of considerable size, *metallic tinkling* may be heard, either attending the ordinary respiration, or as the effect of the patient coughing, or speaking, or suddenly moving. It is a peculiar, clear, sharp, *ringing* sound, which cannot be easily mistaken for any other ; of uncommon occurrence ; rarely persistent ; and appearing and disappearing at different examinations. Sometimes it is associated with *metallic echo*.

One of the common and curious effects of pneumothorax is the alteration which it often induces in the previously existing physical signs. If, for example, there had been a well defined vomica, immediately upon the occur-

rence of the perforation, all signs of a tubercular cavity may possibly disappear; and so of other indications of less advanced tubercular disease, these may either temporarily or permanently cease, or their local position may be changed. Such alterations are, of course, dependent upon the pressure of the escaped air upon the parts in its vicinity.

In cases of extensive pneumothorax, the heart is often pushed from its proper position, and the line of the mediastinum sensibly altered.

Hydro-pneumothorax. After pneumothorax has existed some little time, and especially if it be rather extensive, the pleural cavity very frequently becomes more or less occupied by fluid, and the physical signs of *hydro-pneumothorax* are the result. These ordinarily consist of a mixture of those of simple pneumothorax, with those of pleuritic effusion. There is dulness on percussion with absence of respiratory murmur at the base of the lung, changing its limits as the patient changes his position; the percussion sound above this point is *abruptly* clear or tympanitic, and the breathing deficient, feeble,

or sometimes amphoric. *Metallic tinkling* or *echo* is very frequently heard. On gently agitating the patient's chest, a distinct *splashing* noise is sometimes audible. I have seen this made evident even to bystanders, by the patient himself suddenly moving his own thorax.

CHAPTER VIII.

ACUTE PHTHISIS ; AND TUBERCULAR LARYNGITIS.

Acute phthisis differs from the chronic form of the disease mainly in its greater severity and shorter duration ; it is, therefore, unnecessary to enter minutely into all its physical signs, since these consist chiefly of a modification of those already discussed.

Little value can be attached in really acute phthisis to the evidence afforded by percussion. In some instances, perhaps, the lungs' apices may furnish early proof of consolidation, but this is not generally the case. Oftener than not, the percussion note, at least at the commencement of the disease, will not serve to distinguish the attack from one of ordinary bronchitis. This is particularly the case in children, who, far more frequently than adults, are the subjects of this

form of phthisis. I have seen the disease in infants, when the percussion sound was undistinguishable from that of health. As the disease progresses, however, especially in patients more advanced in life, there may be a variable amount of dulness at the apices, as well as in other parts of the lungs; the dulness appearing rather in irregular patches, than occupying any particular or large space.

The respiratory murmurs seldom afford any evidence of the real nature of the disease; they are generally feeble, harsh, or bronchial, but for the most part masked by accompanying râles.

The rhonchi first noticed are those indicative of bronchitis only, such as the sibilant, sonorous, and subcrepitant, the three often existing simultaneously, but the latter being the most frequent, and by far the most abundant. The fine crepitation of pneumonia is of uncommon occurrence. Sooner or later, however, the *humid click* is pretty sure to manifest itself, associated with, and almost obscured by, some of the other sounds. Very often this proves the sole guide to the true nature of the case; in two instances which have recently come under my notice, no-

thing had previously indicated the formidable character of the disease.

The physical signs of acute phthisis seldom exhibit large vomicæ. The tubercular deposit usually being more diffused throughout the lung than in the chronic form of consumption, the pulmonary tissue is everywhere broken down by rapid softening, rather than by the more localized and chronic process in which cavities are ordinarily formed. I have seen but two cases of acute phthisis in which cavities could be distinctly diagnosed. The disease, indeed, is generally fatal long before large vomicæ can have time for their development.

Tubercular Laryngitis. This variety of the disease requires but little to be said about it, since it differs in nothing from ordinary phthisis, except in the addition of certain symptoms referrible to the larynx and trachea. It has, consequently, the same association and sequence of pulmonary signs, as we have been discussing throughout; although, it often happens, that many of them, and especially those relating to the respiration, are masked or rendered valueless, either by the greater loudness of the morbid

sounds arising in the trachea or larynx, extending themselves some distance below the clavicle to the exclusion of every other,—or by the small amount of air which finds a passage through the larynx, causing the lungs, which might otherwise perhaps be tolerably expansible, to present but a feeble and deficient respiratory murmur. Hence it is, that in many of these cases, we are often entirely dependent upon percussion and inspection, in order to arrive at the physical condition of the chest.

The respiratory sound in the healthy larynx and trachea differs from that of the lungs, in being loud, shrill, and blowing, and having the two murmurs of equal length, but divided from each other. Morbid tracheal respiration consists principally of the addition of harshness and loudness to these qualities, and the occasional association of rhonchi either of the sonorous character peculiar to the larger tubes, or, of the gurgling nature of those generated in cavities. Any further distinction of such sounds I believe to be altogether valueless ; because, whenever the larynx or trachea becomes the seat of tubercular disease, the general symptoms are suffi-

ciently evident ; and I doubt the possibility of any physical signs informing us of the actual pathological condition of the laryngeal mucous surface ;—for example, whether, and if so to what degree, it is either thickened, softened, or ulcerated.

The physical examination of the larynx is, therefore, of comparatively little importance to that of the lungs. It is useful, however, to have a general acquaintance with the phenomena it presents, in order that sounds originating in the upper part of the air passages, may neither be falsely ascribed to the lungs, nor mislead us, by masking the proper characters of the pulmonary respiration.

In concluding this description of the physical signs of phthisis, I would only remark that however complex they may appear, they are easily mastered, and require only a little practical experience to render them easy of application, and of inestimable value in diagnosis.

THE END.



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